

CLAIMS

1. A fluid warming cassette, comprising:
 - a first sheet and a second sheet joined together to form a fluid container with a periphery, the periphery having a proximal end, a distal end and first and second sides there between;
 - a fluid channel in the fluid container between the first sheet and the second sheet;
 - first and second rails disposed between the first sheet and second sheet, inside the periphery, near the first and second edges, respectively; and
 - a planar stiffener, separate from the first and second rails, disposed between the first sheet and the second sheet, and between the first and second rails, near the proximal end.
2. The fluid warming cassette of claim 1 in which each of the first and second rails has a multi-lateral cross-section.
3. The fluid warming cassette of claim 2, in which each of the first and second rails has a first surface supporting a respective arch of the first sheet and a second surface, opposite the first surface and flush with the second sheet.
4. The fluid warming cassette of claim 1 in which the stiffener has a first elongate portion extending between the first and second rails and a second portion protruding from the first portion in the direction of the distal end.
5. The fluid warming cassette of claim 4 in which the fluid channel is disposed between the first and second rails, and between the second portion and the distal end.
6. The fluid warming cassette of claim 1 further including a handle formed in the fluid container against the stiffener.

7. The fluid warming cassette of claim 6 in which the handle includes the first and second sheets sandwiching the stiffener.

8. The fluid warming cassette of claim 7 in which the stiffener has a first elongate portion extending between the first and second rails and a second portion protruding from the first portion toward the fluid channel.

9. The fluid warming cassette of claim 7 in which the handle portion includes a label surface.

10. The fluid warming cassette of claim 1 further including first and second ports in fluid communication with the fluid channel.

11. The fluid warming cassette of claim 10 in which the first and second ports are disposed perpendicularly to the fluid container.

12. The fluid warming cassette of claim 11 in which the first and second ports constitute a cassette insertion stop.

13. The fluid warming cassette of claim 1 in which the rails are made from a material selected from the group consisting of polyvinyl chloride (PVC), polyurethane, polyolefin, polypropylene, polyethylene, polyester, and other polymeric materials.

14. The fluid warming cassette of claim 1 in which the rails are made from a material selected from the group consisting of spring steel, aluminum, and other metallic materials.

15. The fluid warming cassette of claim 1 in which the rails are made from a composite material.

16. The fluid warming cassette of claim 1 in which the stiffener is made from high density polyethylene.

17. The fluid warming cassette of claim 1 in which the stiffener is made from a material selected from the group consisting of polycarbonate, ABS and PVC.

18. The fluid warming cassette of claim 1 in which the stiffener is made from cardboard or card stock.

19. The fluid warming cassette of claim 1 in which the stiffener is made from metal.

20. The fluid warming cassette of claim 1 in which the first sheet and second sheet are made from a material selected from the group consisting of polyester, polyamide (Nylon®, DuPont), polyethylene glycol terephthalate (Mylar®, DuPont), metal foils, ionomer resins (Surlyn®, DuPont), polyolefin, polyethylene, polypropylene, polyvinyl chloride (PVC), polyurethane, and ethyl vinyl acetate (EVA) co-polymer.

21. The fluid warming cassette of claim 1 in which the first sheet includes a plurality of layers and the second sheet includes a plurality of layers.

22. The fluid warming cassette of claim 21 in which the first sheet includes an inner layer and an outer layer laminated to the inner layer; and

in which the second sheet includes an inner layer and an outer layer laminated to the inner layer.

23. The fluid warming cassette of claim 22 in which the inner layers of the first and second sheets are formed from a first material having a first melting point, and the outer layers of the first and second sheets are formed from a second material having a second melting point which is higher than the first melting point.

24. The fluid warming cassette of claim 22 in which the inner layers of the first and second sheets are joined by a thermo-bond or by extrusion coating.

25 The fluid warming cassette of claim 22 in which the outer layer material is selected from the group of materials consisting of polyester, polyamide, polyethylene glycol terephthalate, metal foils, and ionomer resins.

26 The fluid warming cassette of claim 22 in which the inner layer material is selected from the group of materials consisting of polyolefin (polyethylene, polypropylene), polyvinyl chloride (PVC), polyurethane, and ethyl vinyl acetate (EVA) co-polymer.

27 The fluid warming cassette of claim 1 in which the fluid channel has a serpentine pattern.

28. A fluid warming cassette comprising:
a flexible, planar fluid container with a periphery two edges, a proximal end, and a distal end;
a fluid channel in the fluid container, the fluid channel having two ends;
first and second rails disposed in the fluid container, inside the periphery, near the first and second edges, respectively;
at least one of the rails for keying the fluid warming cassette for insertion into a fluid warming unit
a planar stiffener, separate from the first and second rails, disposed in the fluid container, between the first and second rails, near the proximal end; and
two fluid ports on the fluid container, each fluid port in fluid communication with a respective end of the fluid channel and disposed perpendicularly to the fluid container.

29. A fluid warming cassette comprising:
a flexible fluid container with two edges and two ends;
a fluid channel in the fluid container;
first and second rails disposed in the fluid container, near first and second edges of the fluid container, respectively; and
a handle portion formed near an end of the fluid container by sandwiching a planar piece in the fluid container.

30. The fluid warming cassette of claim 29, in which the planar piece is for stiffening the fluid container transversely between the first and second rails.

31. The fluid warming cassette of claim 30, in which at least one rail has a shape for keying the insertion of the cassette into a fluid warming unit.

32. The fluid warming cassette of claim 31, further including an inlet port, perpendicular to the fluid container and opening into the fluid channel, and an outlet port, perpendicular to the fluid container and opening into the fluid channel.

33. The fluid warming cassette of claim 32, in which the planar piece has a first section extending transversely between the rails, near the end, and a second section extending from the first section toward the fluid channel.

34. A process for making a fluid warming cassette comprising:
disposing a base sheet of flexible plastic material;
positioning a first rail in alignment with a first edge of the base sheet and a second rail, parallel to the first rail, in alignment with a second edge of the base sheet;
positioning a planar stiffener in alignment with an end of the base sheet, between the first rail and the second rail; and
joining a covering sheet of flexible plastic material sheet to the base sheet to enclose the first and second rails and the stiffener and form a fluid channel .

35. A fluid warming kit, including:

a fluid warming cassette constituted of a flexible, planar fluid container with a periphery, two edges, a proximal end, and a distal end, a fluid channel in the fluid container, rails disposed in the fluid container, inside the periphery, near the edges, a planar stiffener, separate from the rails, disposed in the fluid container, between the rails, near the proximal end, and inlet and outlet ports perpendicular to the fluid warming cassette and opening into the fluid channel;

an inlet line including an inlet end for receiving fluid from one or more sources, a drip chamber with an inlet coupled to the first end and an outlet coupled to the inlet port; and

an outlet line including a bubble trap with an inlet coupled to the outlet port and an outlet, an injection site coupled to the outlet of the bubble trap, and an outlet end for delivering warmed fluid.